

# SEARCH REQUEST FORM

## Scientific and Technical Information Center

Requester's Full Name: Jonathan Crepeau Examiner #: 75637 Date: 11-1-04  
 Art Unit: 1746 Phone Number 80272-1299 Serial Number: 10/050,926  
 Mail Box and Bldg/Room Location: 6C-11 Results Format Preferred (circle): PAPER DISK E-MAIL

If more than one search is submitted, please prioritize searches in order of need.

Please provide a detailed statement of the search topic, and describe as specifically as possible the subject matter to be searched. Include the elected species or structures, keywords, synonyms, acronyms, and registry numbers, and combine with the concept or utility of the invention. Define any terms that may have a special meaning. Give examples or relevant citations, authors, etc, if known. Please attach a copy of the cover sheet, pertinent claims, and abstract.

Title of Invention: \_\_\_\_\_

Inventors (please provide full names): \_\_\_\_\_

Earliest Priority Filing Date: \_\_\_\_\_

\*For Sequence Searches Only\* Please include all pertinent information (parent, child, divisional, or issued patent numbers) along with the appropriate serial number.

(Please see attached.)

(NOT MUCH OUT THERE CLOSE)

### STAFF USE ONLY

Searcher: EJ

Searcher Phone #: \_\_\_\_\_

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Date Searcher Picked Up: \_\_\_\_\_

Date Completed: 11-3-04

Searcher Prep & Review Time: \_\_\_\_\_

Clerical Prep Time: \_\_\_\_\_

Online Time: \_\_\_\_\_

### Type of Search

NA Sequence (#) \_\_\_\_\_ STN \_\_\_\_\_

AA Sequence (#) \_\_\_\_\_ Dialog \_\_\_\_\_

Structure (#) \_\_\_\_\_ Questel/Orbit \_\_\_\_\_

Bibliographic \_\_\_\_\_ Dr.Link \_\_\_\_\_

Litigation \_\_\_\_\_ Lexis/Nexis \_\_\_\_\_

Fulltext \_\_\_\_\_ Sequence Systems \_\_\_\_\_

Patent Family \_\_\_\_\_ WWW/Internet \_\_\_\_\_

Other \_\_\_\_\_ Other (specify) \_\_\_\_\_

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- the appropriate serial number.
- \*For Foreign Patent Family Searches Only\*  
Include the country name and patent number.
- Provide examples or give us relevant citations, authors, etc., if known.
- FAX or send the **abstract, pertinent claims** (not all of the claims), **drawings, or chemical structures** to your EIC or branch library.

**Enter your Search Topic Information below:**

A battery electrode having any of the compositions defined in attached claims 1, 14, or 21.

Even though elements A and B are written in the formulas as " $+A + bB$ ," these are the critical parts of the formulas and should be searched as being an integral element in the compounds. ↗

(Authors' citation) not actually indexed this way, so had to search it both ways to (be) safe. )

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**Enter the case serial number (Required):**

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Class / Subclass(es)

Earliest Priority Filing Date:

**Format preferred for results:**

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**Provide detailed information on your search topic:**

- In your own words, describe in detail the concepts or subjects you want us to search.
- Include synonyms, keywords, and acronyms. Define terms that have special meanings.
- \*For Chemical Structure Searches Only\*  
Include the elected species or structures, keywords, synonyms, acronyms, and registry numbers
- \*For Sequence Searches Only\*  
Include all pertinent information (parent, child, divisional, or issued patent numbers) along with

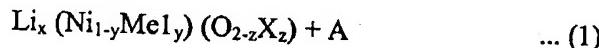
Anukt

has typos

IN THE CLAIMS

Please amend the claims as follows:

Claim 1 (Currently Amended): A lithium ion secondary battery, comprising:  
a positive electrode comprising an active material containing a composite oxide;  
a negative electrode; and a nonaqueous electrolyte;  
the composite oxide having a composition represented by a structural formula (1)  
given below:



where Me<sub>1</sub> is at least one kind of an element selected from the group consisting of B, Mg, Al, Sc, Ti, V, Cr, Mn, Co, Cu, Zn, Ga, Y, Zr, Nb, Mo, Tc, Ru, Sn, La, Hf, Ta, W, Re, Pb and Bi, X is at least one kind of a halogen element selected from the group consisting of F, Cl, Br and I, the molar ratios x, y, z are  $0.02 \leq x \leq 1.3$ ,  $0.005 \leq y \leq 0.5$ , and  $0.01 \leq z \leq 0.5$ , A contains Ca and at least one element selected from the group consisting of Na, K and S, and each of the Na content, the K content and the S content of the composite oxide falls within a range of between from 600 ppm and to 3,000 ppm, and the Ca content in said composite oxide is not higher than 500 ppm.

Claim 2 (Cancelled)

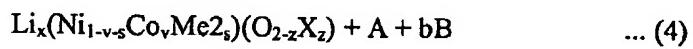
Claim 3 (Currently Amended): A lithium ion secondary battery according to claim 2 1, wherein said element A includes a combination of Ca, Na and S, a combination of Na and Ca or a combination of S and Ca.

$0.01 \leq z \leq 0.5$ , A contains Ca and at least one element selected from the group consisting of Na, K and S, and each of the Na content, the K content and the S content of the composite oxide falls within a range of between from 600 ppm and to 3,000 ppm and the Ca content in said composite oxide falls within a range of from 20 ppm to 500 ppm.

Claim 12 (Cancelled).

Claim 13 (Original): A lithium ion secondary battery according to claim 11, wherein said element Me2 is at least one kind of an element selected from the group consisting of Ti, V, Cr, Zr, Nb, Mo, Hf, Ta and W.

Claim 14 (Currently Amended): A lithium ion secondary battery, comprising:  
a positive electrode comprising an active material containing a composite oxide;  
a negative electrode; and  
a nonaqueous electrolyte;  
the composite oxide having a composition represented by a structural formula (4)  
given below:



$\text{Me}_2 + \text{A} + \text{B}$

where Me2 is at least one kind of an element selected from the group consisting of B, Mg, Al, Sc, Ti, V, Cr, Mn, Cu, Zn, Ga, Y, Zr, Nb, Mo, Tc, Ru, Sn, La, Hf, Ta, W, Re, Pb and Bi, X is at least one kind of a halogen element selected from the group consisting of F, Cl, Br and I, the molar ratios x, v, s and z are  $0.02 \leq x \leq 1.3$ ,  $0.005 \leq v \leq 0.5$ ,  $0.005 \leq s \leq 0.5$  and  $0.01 \leq z \leq 0.5$ , A contains Ca and at least one element selected from the group consisting of Na, K and S, each of the Na content, the K content and the S content of the composite oxide falls within a range of between from 600 ppm and to 3,000 ppm, the Ca content in said composite oxide is not higher than 500 ppm, B contains at least one element selected from the group consisting of Si and Fe, and the content b of said element B in said composite oxide falls within a range of between from 20 ppm and to 500 ppm.

Claim 15 (Cancelled).

Claim 16 (Original): A lithium ion secondary battery according to claim 14, wherein said element Me2 is at least one kind of an element selected from the group consisting of Ti, V, Cr, Zr, Nb, Mo, Hf, Ta and W.

Claim 17 (Cancelled).

Claim 18 (Cancelled).

Claim 19 (Cancelled).

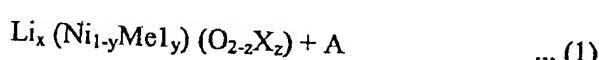
Claim 20 (Cancelled).

Claim 21. (New) A lithium ion secondary battery, comprising:

a positive electrode comprising an active material containing a composite oxide;

a negative electrode; and a nonaqueous electrolyte;

the composite oxide having a composition represented by a structural formula (1)  
given below:



where Me1 is at least one kind of an element selected from the group consisting of B, Mg, Al, Sc, Ti, V, Cr, Mn, Co, Cu, Zn, Ga, Y, Zr, Nb, Mo, Tc, Ru, Sn, La, Hf, Ta, W, Re, Pb and Bi, X is at least one kind of a halogen element selected from the group consisting of F, Cl, Br and I, the molar ratios x, y, z are  $0.02 \leq x \leq 1.3$ ,  $0.005 \leq y \leq 0.5$ , and  $0.01 \leq z \leq 0.5$ , A contains Na and S, and each of the Na content and the S content of the composite oxide falls within a range of from 600 ppm to 3,000 ppm.

*was cancelled*

22. (New) A lithium ion secondary battery according to claim 2, wherein said composite oxide further includes an element B containing at least one element selected from the group consisting of Se and Fe.

23. (New) A lithium ion secondary battery according to claim 22, wherein the content of said element B in said composite oxide falls within a range of from 20 ppm to 500 ppm.

24. (New) A lithium ion secondary battery according to claim 22, wherein the content of said element B in said composite oxide falls within a range of from 20 ppm to 250 ppm.

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 L3 2 S L2 (L) CO/ELS (L) (SI OR FE)/ELS  
 L4 2 S L1 (L) NA/ELS (L) S/ELS  
 L5 1 S L4 NOT CA/ELS

FILE 'CAOLD' ENTERED AT 18:15:51 ON 03 NOV 2004  
 L6 0 S L2  
 L7 0 S L3  
 L8 0 S L4  
 L9 0 S L5

FILE 'ZCPLUS' ENTERED AT 18:16:05 ON 03 NOV 2004  
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 L12 1 S L4  
 L13 1 S L5

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*One invention  
the same*

*JJU claim 1*

=> d 110 1-2 ibib abs hitstr hitrn

L10 ANSWER 1 OF 2 ZCPLUS COPYRIGHT 2004 ACS on STN  
 ACCESSION NUMBER: 2002:573503 ZCPLUS  
 DOCUMENT NUMBER: 137:143014  
 TITLE: Secondary lithium ion battery, cathode active  
       mass, and magnesia-based sagger for firing  
       lithium mixed oxide  
 INVENTOR(S): Kanai, Hideyuki

PATENT ASSIGNEE(S): Toshiba Corp., Japan  
 SOURCE: Jpn. Kokai Tokkyo Koho, 14 pp.  
 DOCUMENT TYPE: Patent  
 LANGUAGE: Japanese  
 FAMILY ACC. NUM. COUNT: 1  
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP <u>2002216758</u>	A2	<u>20020802</u>	<u>JP 2001-14890</u>	<u>200101</u>
JP 3552210	B2	20040811		<u>23</u>
PRIORITY APPLN. INFO.: JP 2001-14890				200101
				23

AB The title battery is equipped with a cathode contg. a Li-contg. mixed oxide as cathode active mass, which is obtained by firing raw material powder in a sagger contg. MgO and/or MgAl<sub>2</sub>O<sub>4</sub> spinel. The cathode active mass is also claimed. The sagger is also claimed. The cathode active mass has desired grain size distribution and the battery provides high safety by preventing ignition and long cycle life.

IT 444728-06-7P 444728-10-3P  
 (lithium mixed oxide fired in sagger contg. MgO or MgAl<sub>2</sub>O<sub>4</sub> for cathode in lithium battery)

RN 444728-06-7 ZCPLUS

CN Calcium cobalt lithium nickel sodium sulfur fluoride oxide (9CI)  
 (CA INDEX NAME)

Component	Ratio	Component	Registry Number
O	x		17778-80-2
F	x		14762-94-8
S	x		7704-34-9
Ca	x		7440-70-2
Co	x		7440-48-4
Na	x		7440-23-5
Ni	x		7440-02-0
Li	x		7439-93-2

RN 444728-10-3 ZCPLUS

CN Calcium cobalt iron lithium nickel sodium fluoride oxide (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	x	17778-80-2
F	x	14762-94-8
Ca	x	7440-70-2
Co	x	7440-48-4
Na	x	7440-23-5
Ni	x	7440-02-0
Li	x	7439-93-2
Fe	x	7439-89-6

IT 444728-06-7P 444728-10-3P

(lithium mixed oxide fired in sagger contg. MgO or MgAl2O4 for cathode in lithium battery)

L10 ANSWER 2 OF 2 ZCPLUS COPYRIGHT 2004 ACS on STN      PD  
 ACCESSION NUMBER: 2000:260192 ZCPLUS  
 DOCUMENT NUMBER: 132:296710  
 TITLE: Manufacture of enameled steel sheets using a composition enabling to avoid fish-scale  
 INVENTOR(S): Hemmen, Pascale; Cholet, Vincent; Vitter, Gerard  
 PATENT ASSIGNEE(S): Sollac, Fr.  
 SOURCE: PCT Int. Appl., 25 pp.  
 DOCUMENT TYPE: Patent  
 LANGUAGE: French  
 FAMILY ACC. NUM. COUNT: 1  
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2000021896	A1	20000420	WO 1999-FR2383	199910 06
W: BR, CA, JP, KR, US				
RW: AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE				
FR 2784696	A1	20000421	FR 1998-12912	199810 14
FR 2784696	B1	20001110		
CA 2347142	AA	20000420	CA 1999-2347142	199910 06
BR 9914517	A	20010626	BR 1999-14517	

EP 1140719	A1	20011010	EP 1999-970375	199910 06
EP 1140719	B1	20020904		199910 06
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, FI				
JP 2002527614	T2	20020827	JP 2000-575807	
AT 223357	E	20020915	AT 1999-970375	199910 06
PT 1140719	T	20021231	PT 1999-970375	199910 06
ES 2181503	T3	20030216	ES 1999-970375	199910 06
PRIORITY APPLN. INFO.:				199910 06
FR 1998-12912				A
				199810 14
WO 1999-FR2383				W
				199910 06

AB The two-layer enamel for the manuf. of both sides enameled-resistant steel sheets comprises a vitreous phase contg. .gtoreq.1 dispersed crystal mineral 2-25 wt.% (e.g., 15 or 25% of .beta.-Ga<sub>2</sub>O<sub>3</sub>) having a protonic cond. >10<sup>-6</sup> S.cm<sup>-1</sup> at 3000. The mineral is dispersed in a proportion sufficient for providing the enamel with impermeability to hydrogen >10<sup>-11</sup> g.cm<sup>-2</sup>s<sup>-1</sup> in the range of temps. between 3000 and the enamel glass transition temp. The dew point of the firing atm. is >50. The firing temp. is less than a low temp. limit of .alpha.-.gamma. transformation of the steel. The cooling rate of enameled steel sheets is >100/min between Ac<sub>3</sub> and the enamel glass transition temp. (Ac<sub>3</sub> is a top temp. limit of .alpha.-.gamma. transformation of the steel).

IT 264626-01-9

(enameling with; manuf. of enameled steel sheets using a compn. enabling to avoid fish-scale)

RN 264626-01-9 ZCAPLUS

CN Aluminum barium boron calcium cobalt lithium nickel phosphorus potassium silicon sodium zirconium fluoride oxide  
(Al<sub>0.08</sub>Ba<sub>0.01</sub>B<sub>0.28</sub>Ca<sub>0.08</sub>Co<sub>0.01</sub>Li<sub>0.04</sub>Ni<sub>0.01</sub>P<sub>0.01</sub>K<sub>0.03</sub>Si<sub>0.5</sub>Na<sub>0.27</sub>Zr<sub>0.01</sub>F<sub>0.03</sub>O<sub>1.84</sub>) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	1.84	17778-80-2
F	0.03	14762-94-8
P	0.01	7723-14-0
Ca	0.08	7440-70-2
Zr	0.01	7440-67-7
Co	0.01	7440-48-4
B	0.28	7440-42-8
Ba	0.01	7440-39-3
Na	0.27	7440-23-5
Si	0.5	7440-21-3
K	0.03	7440-09-7
Ni	0.01	7440-02-0
Li	0.04	7439-93-2
Al	0.08	7429-90-5

IT 264626-01-9

(enameling with; manuf. of enameled steel sheets using a compn.  
enabling to avoid fish-scale)

REFERENCE COUNT:

6

THERE ARE 6 CITED REFERENCES AVAILABLE FOR  
THIS RECORD. ALL CITATIONS AVAILABLE IN  
THE RE FORMAT

=&gt; d 111 1-2 ibib abs hitstr hitrn

*same as before**Wk claim 14*

L11 ANSWER 1 OF 2 ZCPLUS COPYRIGHT 2004 ACS on STN  
 ACCESSION NUMBER: 2002:573503 ZCPLUS  
 DOCUMENT NUMBER: 137:143014  
 TITLE: Secondary lithium ion battery, cathode active mass, and magnesia-based sagger for firing lithium mixed oxide  
 INVENTOR(S): Kanai, Hideyuki  
 PATENT ASSIGNEE(S): Toshiba Corp., Japan  
 SOURCE: Jpn. Kokai Tokkyo Koho, 14 pp.  
 DOCUMENT TYPE: Patent  
 LANGUAGE: Japanese  
 FAMILY ACC. NUM. COUNT: 1  
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 2002216758	A2	20020802	JP 2001-14890	

JP 3552210 B2 20040811 200101  
 PRIORITY APPLN. INFO.: JP 2001-14890 23  
 200101  
 23

AB The title battery is equipped with a cathode contg. a Li-contg. mixed oxide as cathode active mass, which is obtained by firing raw material powder in a sagger contg. MgO and/or MgAl<sub>2</sub>O<sub>4</sub> spinel. The cathode active mass is also claimed. The sagger is also claimed. The cathode active mass has desired grain size distribution and the battery provides high safety by preventing ignition and long cycle life.

IT 444728-10-3P  
 (lithium mixed oxide fired in sagger contg. MgO or MgAl<sub>2</sub>O<sub>4</sub> for cathode in lithium battery)

RN 444728-10-3 ZCPLUS

CN Calcium cobalt iron lithium nickel sodium fluoride oxide (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	x	17778-80-2
F	x	14762-94-8
Ca	x	7440-70-2
Co	x	7440-48-4
Na	x	7440-23-5
Ni	x	7440-02-0
Li	x	7439-93-2
Fe	x	7439-89-6

IT 444728-10-3P  
 (lithium mixed oxide fired in sagger contg. MgO or MgAl<sub>2</sub>O<sub>4</sub> for cathode in lithium battery)

L11 ANSWER 2 OF 2 ZCPLUS COPYRIGHT 2004 ACS on STN  
 ACCESSION NUMBER: 2000:260192 ZCPLUS

DOCUMENT NUMBER: 132:296710

TITLE: Manufacture of enameled steel sheets using a

composition enabling to avoid fish-scale  
 Hemmen, Pascale; Cholet, Vincent; Vitter, Gerard  
 Sollac, Fr.

INVENTOR(S):

PATENT ASSIGNEE(S):

SOURCE: PCT Int. Appl., 25 pp.

CODEN: PIXXD2

Patent

French

DOCUMENT TYPE:

LANGUAGE:

FAMILY ACC. NUM. COUNT: 1  
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2000021896	A1	20000420	WO 1999-FR2383	199910 06
W: BR, CA, JP, KR, US RW: AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE				
FR 2784696	A1	20000421	FR 1998-12912	199810 14
FR 2784696	B1	20001110		
CA 2347142	AA	20000420	CA 1999-2347142	
BR 9914517	A	20010626	BR 1999-14517	199910 06
EP 1140719	A1	20011010	EP 1999-970375	199910 06
EP 1140719	B1	20020904		199910 06
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, FI				
JP 2002527614	T2	20020827	JP 2000-575807	
AT 223357	E	20020915	AT 1999-970375	199910 06
PT 1140719	T	20021231	PT 1999-970375	199910 06
ES 2181503	T3	20030216	ES 1999-970375	199910 06
PRIORITY APPLN. INFO.:			FR 1998-12912	A
				199810 14
			WO 1999-FR2383	W
				199910 06

AB The two-layer enamel for the manuf. of both sides enameled-resistant steel sheets comprises a vitreous phase contg. .gtoreq.1 dispersed crystal mineral 2-25 wt.% (e.g., 15 or 25% of  $\beta$ -Ga<sub>2</sub>O<sub>3</sub>) having a protonic cond.  $>10^{-6}$  S.cntdot.cm<sup>-1</sup> at 3000. The mineral is dispersed in a proportion sufficient for providing the enamel with impermeability to hydrogen  $>10^{-11}$  g.cntdot.cm<sup>-2</sup>s<sup>-1</sup> in the range of temps. between 3000 and the enamel glass transition temp. The dew point of the firing atm. is  $>50$ . The firing temp. is less than a low temp. limit of  $\alpha$ - $\gamma$  transformation of the steel. The cooling rate of enameled steel sheets is  $>100$ /min between Ac<sub>3</sub> and the enamel glass transition temp. (Ac<sub>3</sub> is a top temp. limit of  $\alpha$ - $\gamma$  transformation of the steel).

IT 264626-01-9

(enameling with; manuf. of enameled steel sheets using a compn. enabling to avoid fish-scale)

RN 264626-01-9 ZCPLUS

CN Aluminum barium boron calcium cobalt lithium nickel phosphorus potassium silicon sodium zirconium fluoride oxide  
 $(Al_{0.08}Ba_{0.01}B_{0.28}Ca_{0.08}Co_{0.01}Li_{0.04}Ni_{0.01}P_{0.01}K_{0.03}Si_{0.5}Na_{0.27}Zr_{0.01}F_{0.03}O_{1.84})$  (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	1.84	17778-80-2
F	0.03	14762-94-8
P	0.01	7723-14-0
Ca	0.08	7440-70-2
Zr	0.01	7440-67-7
Co	0.01	7440-48-4
B	0.28	7440-42-8
Ba	0.01	7440-39-3
Na	0.27	7440-23-5
Si	0.5	7440-21-3
K	0.03	7440-09-7
Ni	0.01	7440-02-0
Li	0.04	7439-93-2
Al	0.08	7429-90-5

IT 264626-01-9

(enameling with; manuf. of enameled steel sheets using a compn. enabling to avoid fish-scale)

REFERENCE COUNT:

6

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=> d 112 1 ibib abs hitstr hitrn

↓↓ claim 21

*same as before*

L12 ANSWER 1 OF 1 ZCPLUS COPYRIGHT 2004 ACS on STN  
 ACCESSION NUMBER: 2002:573503 ZCPLUS  
 DOCUMENT NUMBER: 137:143014  
 TITLE: Secondary lithium ion battery, cathode active mass, and magnesia-based sagger for firing lithium mixed oxide  
 INVENTOR(S): Kanai, Hideyuki  
 PATENT ASSIGNEE(S): Toshiba Corp., Japan  
 SOURCE: Jpn. Kokai Tokkyo Koho, 14 pp.  
 DOCUMENT TYPE: Patent  
 LANGUAGE: Japanese  
 FAMILY ACC. NUM. COUNT: 1  
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 2002216758	A2	20020802	JP 2001-14890	200101 23
JP 3552210	B2	20040811	JP 2001-14890	200101 23

PRIORITY APPLN. INFO.:

AB The title battery is equipped with a cathode contg. a Li-contg. mixed oxide as cathode active mass, which is obtained by firing raw material powder in a sagger contg. MgO and/or MgAl<sub>2</sub>O<sub>4</sub> spinel. The cathode active mass is also claimed. The sagger is also claimed. The cathode active mass has desired grain size distribution and the battery provides high safety by preventing ignition and long cycle life.

IT 444728-06-7P 444728-09-0P  
 (lithium mixed oxide fired in sagger contg. MgO or MgAl<sub>2</sub>O<sub>4</sub> for cathode in lithium battery)

RN 444728-06-7 ZCPLUS

CN Calcium cobalt lithium nickel sodium sulfur fluoride oxide (9CI)  
 (CA INDEX NAME)

Component	Ratio	Component	Registry Number
O	x		17778-80-2
F	x		14762-94-8
S	x		7704-34-9
Ca	x		7440-70-2

Co	x		7440-48-4
Na	x		7440-23-5
Ni	x		7440-02-0
Li	x		7439-93-2

RN 444728-09-0 ZCPLUS

CN Cobalt lithium nickel sodium sulfur fluoride oxide (9CI) (CA INDEX  
NAME)

Component	Ratio	Component Registry Number
O	x	17778-80-2
F	x	14762-94-8
S	x	7704-34-9
Co	x	7440-48-4
Na	x	7440-23-5
Ni	x	7440-02-0
Li	x	7439-93-2

IT 444728-06-7P 444728-09-0P

(lithium mixed oxide fired in sagger contg. MgO or MgAl2O4 for  
cathode in lithium battery)

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(dup)

L13 ANSWER 1 OF 1 ZCPLUS COPYRIGHT 2004 ACS on STN  
 ACCESSION NUMBER: 2002:573503 ZCPLUS  
 DOCUMENT NUMBER: 137:143014  
 TITLE: Secondary lithium ion battery, cathode active mass, and magnesia-based sagger for firing lithium mixed oxide  
 INVENTOR(S): Kanai, Hideyuki  
 PATENT ASSIGNEE(S): Toshiba Corp., Japan  
 SOURCE: Jpn. Kokai Tokkyo Koho, 14 pp.  
 DOCUMENT TYPE: Patent  
 LANGUAGE: Japanese  
 FAMILY ACC. NUM. COUNT: 1  
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
JP 2002216758	A2	20020802	JP 2001-14890	

200101

23

JP 3552210 B2 20040811 JP 2001-14890  
 PRIORITY APPLN. INFO.: 200101  
 23

AB The title battery is equipped with a cathode contg. a Li-contg. mixed oxide as cathode active mass, which is obtained by firing raw material powder in a sagger contg. MgO and/or MgAl<sub>2</sub>O<sub>4</sub> spinel. The cathode active mass is also claimed. The sagger is also claimed. The cathode active mass has desired grain size distribution and the battery provides high safety by preventing ignition and long cycle life.

IT **444728-09-0P**

(lithium mixed oxide fired in sagger contg. MgO or MgAl<sub>2</sub>O<sub>4</sub> for cathode in lithium battery)

RN 444728-09-0 ZCPLUS

CN Cobalt lithium nickel sodium sulfur fluoride oxide (9CI) (CA INDEX NAME)

Component	Ratio	Component	Registry Number
O	x		17778-80-2
F	x		14762-94-8
S	x		7704-34-9
Co	x		7440-48-4
Na	x		7440-23-5
Ni	x		7440-02-0
Li	x		7439-93-2

IT **444728-09-0P**

(lithium mixed oxide fired in sagger contg. MgO or MgAl<sub>2</sub>O<sub>4</sub> for cathode in lithium battery)

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FILE 'HCAPLUS' ENTERED AT 18:23:37 ON 03 NOV 2004  
L14 6764 S KANAI ?/AU  
L15 6800 S KANDA ?/AU  
L16 17907 S KUBO ?/AU  
L17 6 S L14 AND L15 AND L16  
SEL L17 1-4 RN

FILE 'REGISTRY' ENTERED AT 18:31:14 ON 03 NOV 2004  
L18 163 S E1-E163  
L19 134 S L1 AND L18  
E CALCIUM/CN  
L20 1 S E3  
E SODIUM/CN  
L21 1 S E3  
E POTASSIUM/CN  
L22 1 S E3  
E SULFUR/CN  
L23 1 S E3

FILE 'ZCAPLUS' ENTERED AT 18:39:02 ON 03 NOV 2004  
L24 69 S L1  
L25 347462 S L20  
L26 208733 S L21  
L27 203406 S L22  
L28 129141 S L23  
L29 1 S L24 AND L25  
L30 1 S L29 AND (L26 OR L27 OR L28)

FILE 'REGISTRY' ENTERED AT 18:40:50 ON 03 NOV 2004  
L31 155 S L1 (L) CO/ELS

FILE 'ZCAPLUS' ENTERED AT 18:41:11 ON 03 NOV 2004  
L32 34 S L31  
L33 1 S L32 AND L25  
L34 1 S L33 AND (L26 OR L27 OR L28)

FILE 'ZCAPLUS' ENTERED AT 18:43:21 ON 03 NOV 2004  
L35 1 S L24 AND (L26 AND L28)  
L36 1 S L30 OR L34 OR L35

=> d 136 1 ibib abs hitstr hitrn

(ended up being inventors' own work)

L36 ANSWER 1 OF 1 ZCAPLUS COPYRIGHT 2004 ACS on STN

ACCESSION NUMBER: 2002:552265 ZCPLUS  
 DOCUMENT NUMBER: 137:127521  
 TITLE: Nickel-based and nickel-cobalt-based mixed  
 oxide-halides as cathode-active materials for  
 lithium-ion secondary batteries  
 INVENTOR(S): Hideyuki, Kanai; Kanda, Motoya; Kubo, Koichi  
 PATENT ASSIGNEE(S): Kabushiki Kaisha Toshiba, Japan  
 SOURCE: Eur. Pat. Appl., 60 pp.  
 DOCUMENT TYPE: CODEN: EPXXDW  
 LANGUAGE: Patent  
 FAMILY ACC. NUM. COUNT: English  
 1  
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
EP 1225650	A2	20020724	EP 2002-250420	200201 22
EP 1225650	A3	20030827		
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR				
JP 2002304994	A2	20021018	JP 2002-12013	200201 21
JP 3530174	B2	20040524		
US 2002150820	A1	20021017	US 2002-50926	200201 22
PRIORITY APPLN. INFO.:			JP 2001-14891	A
				200101 23

AB Cathode active material for lithium ion secondary batteries contain  
 a composite oxide having a compn. of structural formula (1):  
 $Lix(Ni_{1-y}M_y)(O_2-zXz) + A$ , in which M is at least one kind of an  
 element selected from the group consisting of B, Mg, Al, Sc, Ti, V,  
 Cr, Mn, Co, Cu, Zn, Ga, Y, Zr, Nb, Mo, Tc, Ru, Sn, La, Hf, Ta, W,  
 Re, Pb and Bi; X is a halogen (F, Cl, Br and I); x = 0.02-1.3, 0.005  
 .ltoreq. y .ltoreq. 0.5, and z = 0.01-0.5; A contains at least one  
 element selected from the group consisting of Na, K and S, and each  
 of the Na, K, and S contents of the composite oxide is 600-3,000  
 ppm. A related compn. is  $Lix(Ni_{1-v-s}Co_{v}M'_{s})(O_2-zXz) + A$ , in which  
 M', A, and X are as defined above; x = 0.02-1.3, v = 0.005-0.05, s =  
 0.005-0.5, and z = 0.01-0.05.  
 IT 7440-09-7D, Potassium, compds. 7440-23-5D, Sodium,  
 compds. 7440-70-2D, Calcium, compds. 7704-34-9D,

Sulfur, compds. 443892-75-9, Lithium nickel borate fluoride oxide ( $\text{Li}_{1.1}\text{Ni}_{0.88}(\text{BO}_3)_{0.02}\text{F}_{0.101.84}$ ) 443892-76-0  
, Lithium magnesium nickel fluoride oxide ( $\text{Li}_{1.1}\text{Mg}_{0.02}\text{Ni}_{0.88}\text{F}_{0.101.9}$ ) 443892-77-1, Aluminum lithium nickel fluoride oxide ( $\text{Al}_{0.02}\text{Li}_{1.1}\text{Ni}_{0.88}\text{F}_{0.101.9}$ )  
443892-78-2, Lithium nickel scandium fluoride oxide ( $\text{Li}_{1.1}\text{Ni}_{0.88}\text{Sc}_{0.02}\text{F}_{0.101.9}$ ) 443892-79-3, Lithium nickel vanadium fluoride oxide ( $\text{Li}_{1.1}\text{Ni}_{0.88}\text{V}_{0.02}\text{F}_{0.101.9}$ )  
443892-80-6, Chromium lithium nickel fluoride oxide ( $\text{Cr}_{0.02}\text{Li}_{1.1}\text{Ni}_{0.88}\text{F}_{0.101.9}$ ) 443892-81-7, Lithium manganese nickel fluoride oxide ( $\text{Li}_{1.1}\text{Mn}_{0.02}\text{Ni}_{0.88}\text{F}_{0.101.9}$ )  
443892-82-8, Lithium nickel zinc fluoride oxide ( $\text{Li}_{1.1}\text{Ni}_{0.88}\text{Zn}_{0.02}\text{F}_{0.101.9}$ ) 443892-83-9, Gallium lithium nickel chloride oxide ( $\text{Ga}_{0.02}\text{Li}_{1.1}\text{Ni}_{0.88}\text{Cl}_{0.101.9}$ )  
443892-84-0, Lithium nickel vanadium chloride oxide ( $\text{Li}_{1.1}\text{Ni}_{0.88}\text{V}_{0.02}\text{Cl}_{0.101.9}$ ) 443892-85-1, Lithium nickel zirconium chloride oxide ( $\text{Li}_{1.1}\text{Ni}_{0.88}\text{Zr}_{0.02}\text{Cl}_{0.101.9}$ )  
443892-86-2, Lithium molybdenum nickel bromide oxide ( $\text{Li}_{1.1}\text{Mo}_{0.02}\text{Ni}_{0.88}\text{Br}_{0.101.9}$ ) 443892-87-3, Lithium nickel technetium bromide oxide ( $\text{Li}_{1.1}\text{Ni}_{0.88}\text{R}_{99}\text{Tc}_{0.02}\text{Br}_{0.101.9}$ )  
443892-88-4, Lithium nickel ruthenium bromide oxide ( $\text{Li}_{1.1}\text{Ni}_{0.88}\text{Ru}_{0.02}\text{Br}_{0.101.9}$ ) 443892-89-5, Lithium nickel tin bromide oxide ( $\text{Li}_{1.1}\text{Ni}_{0.88}\text{Sn}_{0.02}\text{Br}_{0.101.9}$ ) 443892-90-8  
, Hafnium lithium nickel iodide oxide ( $\text{Hf}_{0.02}\text{Li}_{1.1}\text{Ni}_{0.88}\text{I}_{0.101.9}$ )  
443892-91-9, Lithium nickel tungsten iodide oxide ( $\text{Li}_{1.1}\text{Ni}_{0.88}\text{W}_{0.02}\text{I}_{0.101.9}$ ) 443892-92-0, Lithium nickel rhenium iodide oxide ( $\text{Li}_{1.1}\text{Ni}_{0.88}\text{Re}_{0.02}\text{I}_{0.101.9}$ ) 443892-93-1  
, Bismuth lithium nickel iodide oxide ( $\text{Bi}_{0.02}\text{Li}_{1.1}\text{Ni}_{0.88}\text{I}_{0.101.9}$ )  
443892-94-2, Lithium nickel titanium fluoride oxide ( $\text{Li}_{1.1}\text{Ni}_{0.88}\text{Ti}_{0.02}\text{F}_{0.101.9}$ ) 443892-95-3, Lithium nickel niobium chloride oxide ( $\text{Li}_{1.1}\text{Ni}_{0.88}\text{Nb}_{0.02}\text{Cl}_{0.101.9}$ )  
443892-96-4, Copper lithium nickel chloride oxide ( $\text{Cu}_{0.02}\text{Li}_{1.1}\text{Ni}_{0.88}\text{Cl}_{0.101.9}$ ) 443892-97-5, Lithium nickel tantalum iodide oxide ( $\text{Li}_{1.1}\text{Ni}_{0.88}\text{Ta}_{0.02}\text{I}_{0.101.9}$ )  
443893-00-3, Lanthanum lithium nickel fluoride oxide ( $\text{La}_{0.02}\text{Li}_{1.1}\text{Ni}_{0.88}\text{F}_{0.101.9}$ ) 443893-01-4, Cobalt lithium nickel fluoride oxide ( $\text{Co}_{0.02}\text{Li}_{1.1}\text{Ni}_{0.88}\text{F}_{0.101.9}$ )  
443893-02-5 443893-03-6 443893-04-7  
443893-05-8 443893-06-9 443893-07-0  
443893-08-1 443893-09-2 443893-10-5  
443893-11-6 443893-12-7 443893-13-8,  
Cobalt lithium nickel tin bromide oxide  
( $\text{Co}_{0.18}\text{Li}_{1.1}\text{Ni}_{0.7}\text{Sn}_{0.02}\text{Br}_{0.101.9}$ ) 443893-14-9  
443893-15-0 443893-16-1, Cobalt lead lithium nickel iodide oxide ( $\text{Co}_{0.18}\text{Pb}_{0.02}\text{Li}_{1.1}\text{Ni}_{0.7}\text{I}_{0.101.9}$ )  
443893-17-2 443893-18-3 443893-19-4  
443893-20-7 443893-21-8 443893-22-9  
443893-23-0 443893-24-1 443893-25-2

**443893-26-3**

(cathode material; nickel-based and nickel-cobalt-based mixed oxide-halides as cathode-active materials for lithium-ion secondary batteries)

RN 7440-09-7 ZCPLUS

CN Potassium (8CI, 9CI) (CA INDEX NAME)

**K**

RN 7440-23-5 ZCPLUS

CN Sodium (8CI, 9CI) (CA INDEX NAME)

**Na**

RN 7440-70-2 ZCPLUS

CN Calcium (8CI, 9CI) (CA INDEX NAME)

**Ca**

RN 7704-34-9 ZCPLUS

CN Sulfur (8CI, 9CI) (CA INDEX NAME)

**S**

RN 443892-75-9 ZCPLUS

CN Lithium nickel borate fluoride oxide (Li<sub>1.1</sub>Ni<sub>0.88</sub>(BO<sub>3</sub>)<sub>0.02</sub>F<sub>0.10</sub>I<sub>0.84</sub>) (9CI) (CA INDEX NAME)

Component	Ratio	Component
		Registry Number
O	1.84	17778-80-2
F	0.1	14762-94-8
BO <sub>3</sub>	0.02	14213-97-9
Ni	0.88	7440-02-0
Li	1.1	7439-93-2

RN 443892-76-0 ZCPLUS

CN Lithium magnesium nickel fluoride oxide (Li<sub>1.1</sub>Mg<sub>0.02</sub>Ni<sub>0.88</sub>F<sub>0.10</sub>I<sub>0.9</sub>) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	1.9	17778-80-2
F	0.1	14762-94-8
Ni	0.88	7440-02-0
Mg	0.02	7439-95-4
Li	1.1	7439-93-2

RN 443892-77-1 ZCPLUS

CN Aluminum lithium nickel fluoride oxide (Al0.02Li1.1Ni0.88F0.1O1.9)  
(9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	1.9	17778-80-2
F	0.1	14762-94-8
Ni	0.88	7440-02-0
Li	1.1	7439-93-2
Al	0.02	7429-90-5

RN 443892-78-2 ZCPLUS

CN Lithium nickel scandium fluoride oxide (Li1.1Ni0.88Sc0.02F0.1O1.9)  
(9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	1.9	17778-80-2
F	0.1	14762-94-8
Sc	0.02	7440-20-2
Ni	0.88	7440-02-0
Li	1.1	7439-93-2

RN 443892-79-3 ZCPLUS

CN Lithium nickel vanadium fluoride oxide (Li1.1Ni0.88V0.02F0.1O1.9)  
(9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	1.9	17778-80-2
F	0.1	14762-94-8
V	0.02	7440-62-2
Ni	0.88	7440-02-0
Li	1.1	7439-93-2

RN 443892-80-6 ZCPLUS  
 CN Chromium lithium nickel fluoride oxide ( $\text{Cr}_{0.02}\text{Li}_{1.1}\text{Ni}_{0.88}\text{F}_{0.101.9}$ )  
 (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	1.9	17778-80-2
F	0.1	14762-94-8
Cr	0.02	7440-47-3
Ni	0.88	7440-02-0
Li	1.1	7439-93-2

RN 443892-81-7 ZCPLUS  
 CN Lithium manganese nickel fluoride oxide ( $\text{Li}_{1.1}\text{Mn}_{0.02}\text{Ni}_{0.88}\text{F}_{0.101.9}$ )  
 (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	1.9	17778-80-2
F	0.1	14762-94-8
Ni	0.88	7440-02-0
Mn	0.02	7439-96-5
Li	1.1	7439-93-2

RN 443892-82-8 ZCPLUS  
 CN Lithium nickel zinc fluoride oxide ( $\text{Li}_{1.1}\text{Ni}_{0.88}\text{Zn}_{0.02}\text{F}_{0.101.9}$ ) (9CI)  
 (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	1.9	17778-80-2
F	0.1	14762-94-8
Zn	0.02	7440-66-6
Ni	0.88	7440-02-0
Li	1.1	7439-93-2

RN 443892-83-9 ZCPLUS  
 CN Gallium lithium nickel chloride oxide ( $\text{Ga}_{0.02}\text{Li}_{1.1}\text{Ni}_{0.88}\text{Cl}_{0.101.9}$ )  
 (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
Cl	0.1	22537-15-1

O		1.9		17778-80-2
Ga		0.02		7440-55-3
Ni		0.88		7440-02-0
Li		1.1		7439-93-2

RN 443892-84-0 ZCPLUS

CN Lithium nickel vanadium chloride oxide (Li1.1Ni0.88V0.02Cl0.101.9)  
(9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
Cl	0.1	22537-15-1
O	1.9	17778-80-2
V	0.02	7440-62-2
Ni	0.88	7440-02-0
Li	1.1	7439-93-2

RN 443892-85-1 ZCPLUS

CN Lithium nickel zirconium chloride oxide (Li1.1Ni0.88Zr0.02Cl0.101.9)  
(9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
Cl	0.1	22537-15-1
O	1.9	17778-80-2
Zr	0.02	7440-67-7
Ni	0.88	7440-02-0
Li	1.1	7439-93-2

RN 443892-86-2 ZCPLUS

CN Lithium molybdenum nickel bromide oxide (Li1.1Mo0.02Ni0.88Br0.101.9)  
(9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	1.9	17778-80-2
Br	0.1	10097-32-2
Ni	0.88	7440-02-0
Mo	0.02	7439-98-7
Li	1.1	7439-93-2

RN 443892-87-3 ZCPLUS

CN Lithium nickel technetium bromide oxide  
(Li1.1Ni0.8899Tc0.02Br0.101.9) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	1.9	17778-80-2
Tc	0.02	14133-76-7
Br	0.1	10097-32-2
Ni	0.88	7440-02-0
Li	1.1	7439-93-2

RN 443892-88-4 ZCPLUS

CN Lithium nickel ruthenium bromide oxide (Li<sub>1.1</sub>Ni<sub>0.88</sub>Ru<sub>0.02</sub>Br<sub>0.101.9</sub>)  
(9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	1.9	17778-80-2
Br	0.1	10097-32-2
Ru	0.02	7440-18-8
Ni	0.88	7440-02-0
Li	1.1	7439-93-2

RN 443892-89-5 ZCPLUS

CN Lithium nickel tin bromide oxide (Li<sub>1.1</sub>Ni<sub>0.88</sub>Sn<sub>0.02</sub>Br<sub>0.101.9</sub>) (9CI)  
(CA INDEX NAME)

Component	Ratio	Component Registry Number
O	1.9	17778-80-2
Br	0.1	10097-32-2
Sn	0.02	7440-31-5
Ni	0.88	7440-02-0
Li	1.1	7439-93-2

RN 443892-90-8 ZCPLUS

CN Hafnium lithium nickel iodide oxide (Hf<sub>0.02</sub>Li<sub>1.1</sub>Ni<sub>0.88</sub>I<sub>0.101.9</sub>)  
(9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	1.9	17778-80-2
I	0.1	14362-44-8
Hf	0.02	7440-58-6
Ni	0.88	7440-02-0
Li	1.1	7439-93-2

RN 443892-91-9 ZCPLUS  
 CN Lithium nickel tungsten iodide oxide (Li<sub>1.1</sub>Ni<sub>0.88</sub>W<sub>0.02</sub>I<sub>0.10</sub>.9)  
 (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	1.9	17778-80-2
I	0.1	14362-44-8
W	0.02	7440-33-7
Ni	0.88	7440-02-0
Li	1.1	7439-93-2

RN 443892-92-0 ZCPLUS  
 CN Lithium nickel rhenium iodide oxide (Li<sub>1.1</sub>Ni<sub>0.88</sub>Re<sub>0.02</sub>I<sub>0.10</sub>.9)  
 (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	1.9	17778-80-2
I	0.1	14362-44-8
Re	0.02	7440-15-5
Ni	0.88	7440-02-0
Li	1.1	7439-93-2

RN 443892-93-1 ZCPLUS  
 CN Bismuth lithium nickel iodide oxide (Bi<sub>0.02</sub>Li<sub>1.1</sub>Ni<sub>0.88</sub>I<sub>0.10</sub>.9)  
 (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	1.9	17778-80-2
I	0.1	14362-44-8
Bi	0.02	7440-69-9
Ni	0.88	7440-02-0
Li	1.1	7439-93-2

RN 443892-94-2 ZCPLUS  
 CN Lithium nickel titanium fluoride oxide (Li<sub>1.1</sub>Ni<sub>0.88</sub>Ti<sub>0.02</sub>F<sub>0.10</sub>.9)  
 (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	1.9	17778-80-2
F	0.1	14762-94-8

Ti		0.02		7440-32-6
Ni		0.88		7440-02-0
Li		1.1		7439-93-2

RN 443892-95-3 ZCPLUS

CN Lithium nickel niobium chloride oxide (Li1.1Ni0.88Nb0.02Cl0.101.9)  
(9CI) (CA INDEX NAME)

Component		Ratio		Component
				Registry Number
Cl		0.1		22537-15-1
O		1.9		17778-80-2
Nb		0.02		7440-03-1
Ni		0.88		7440-02-0
Li		1.1		7439-93-2

RN 443892-96-4 ZCPLUS

CN Copper lithium nickel chloride oxide (Cu0.02Li1.1Ni0.88Cl0.101.9)  
(9CI) (CA INDEX NAME)

Component		Ratio		Component
				Registry Number
Cl		0.1		22537-15-1
O		1.9		17778-80-2
Cu		0.02		7440-50-8
Ni		0.88		7440-02-0
Li		1.1		7439-93-2

RN 443892-97-5 ZCPLUS

CN Lithium nickel tantalum iodide oxide (Li1.1Ni0.88Ta0.02I0.101.9)  
(9CI) (CA INDEX NAME)

Component		Ratio		Component
				Registry Number
O		1.9		17778-80-2
I		0.1		14362-44-8
Ta		0.02		7440-25-7
Ni		0.88		7440-02-0
Li		1.1		7439-93-2

RN 443893-00-3 ZCPLUS

CN Lanthanum lithium nickel fluoride oxide (La0.02Li1.1Ni0.88F0.101.9)  
(9CI) (CA INDEX NAME)

Component | Ratio | Component

			Registry Number
O	1.9		17778-80-2
F	0.1		14762-94-8
Ni	0.88		7440-02-0
Li	1.1		7439-93-2
La	0.02		7439-91-0

RN 443893-01-4 ZCPLUS

CN Cobalt lithium nickel fluoride oxide (Co0.02Li1.1Ni0.88F0.1O1.9)  
(9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	1.9	17778-80-2
F	0.1	14762-94-8
Co	0.02	7440-48-4
Ni	0.88	7440-02-0
Li	1.1	7439-93-2

RN 443893-02-5 ZCPLUS

CN Cobalt lithium nickel borate fluoride oxide  
(Co0.18Li1.1Ni0.7(BO3)0.02F0.1O1.84) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	1.84	17778-80-2
F	0.1	14762-94-8
BO3	0.02	14213-97-9
Co	0.18	7440-48-4
Ni	0.7	7440-02-0
Li	1.1	7439-93-2

RN 443893-03-6 ZCPLUS

CN Cobalt lithium magnesium nickel fluoride oxide  
(Co0.18Li1.1Mg0.02Ni0.7F0.1O1.9) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	1.9	17778-80-2
F	0.1	14762-94-8
Co	0.18	7440-48-4
Ni	0.7	7440-02-0
Mg	0.02	7439-95-4
Li	1.1	7439-93-2

RN 443893-04-7 ZCPLUS

CN Aluminum cobalt lithium nickel fluoride oxide  
(Al<sub>0.02</sub>Co<sub>0.18</sub>Li<sub>1.1</sub>Ni<sub>0.7</sub>F<sub>0.101.9</sub>) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	1.9	17778-80-2
F	0.1	14762-94-8
Co	0.18	7440-48-4
Ni	0.7	7440-02-0
Li	1.1	7439-93-2
Al	0.02	7429-90-5

RN 443893-05-8 ZCPLUS

CN Cobalt lithium nickel scandium fluoride oxide  
(Co<sub>0.18</sub>Li<sub>1.1</sub>Ni<sub>0.7</sub>Sc<sub>0.02</sub>F<sub>0.101.9</sub>) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	1.9	17778-80-2
F	0.1	14762-94-8
Co	0.18	7440-48-4
Sc	0.02	7440-20-2
Ni	0.7	7440-02-0
Li	1.1	7439-93-2

RN 443893-06-9 ZCPLUS

CN Cobalt lithium manganese nickel fluoride oxide  
(Co<sub>0.18</sub>Li<sub>1.1</sub>Mn<sub>0.02</sub>Ni<sub>0.7</sub>F<sub>0.101.9</sub>) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	1.9	17778-80-2
F	0.1	14762-94-8
Co	0.18	7440-48-4
Ni	0.7	7440-02-0
Mn	0.02	7439-96-5
Li	1.1	7439-93-2

RN 443893-07-0 ZCPLUS

CN Cobalt copper lithium nickel chloride oxide  
(Co<sub>0.18</sub>Cu<sub>0.02</sub>Li<sub>1.1</sub>Ni<sub>0.7</sub>Cl<sub>0.101.9</sub>) (9CI) (CA INDEX NAME)

Component | Ratio | Component

		Registry Number
Cl	0.1	22537-15-1
O	1.9	17778-80-2
Cu	0.02	7440-50-8
Co	0.18	7440-48-4
Ni	0.7	7440-02-0
Li	1.1	7439-93-2

RN 443893-08-1 ZCPLUS

CN Cobalt lithium nickel zinc chloride oxide  
(Co0.18Li1.1Ni0.7Zn0.02Cl0.101.9) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
Cl	0.1	22537-15-1
O	1.9	17778-80-2
Zn	0.02	7440-66-6
Co	0.18	7440-48-4
Ni	0.7	7440-02-0
Li	1.1	7439-93-2

RN 443893-09-2 ZCPLUS

CN Cobalt gallium lithium nickel chloride oxide  
(Co0.18Ga0.02Li1.1Ni0.7Cl0.101.9) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
Cl	0.1	22537-15-1
O	1.9	17778-80-2
Ga	0.02	7440-55-3
Co	0.18	7440-48-4
Ni	0.7	7440-02-0
Li	1.1	7439-93-2

RN 443893-10-5 ZCPLUS

CN Cobalt lithium nickel yttrium chloride oxide  
(Co0.18Li1.1Ni0.7Y0.02Cl0.101.9) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
Cl	0.1	22537-15-1
O	1.9	17778-80-2
Y	0.02	7440-65-5
Co	0.18	7440-48-4

Ni		0.7		7440-02-0
Li		1.1		7439-93-2

RN 443893-11-6 ZCPLUS

CN Cobalt lithium nickel technetium bromide oxide  
(Co0.18Li1.1Ni0.799Tc0.02Br0.101.9) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	1.9	17778-80-2
Tc	0.02	14133-76-7
Br	0.1	10097-32-2
Co	0.18	7440-48-4
Ni	0.7	7440-02-0
Li	1.1	7439-93-2

RN 443893-12-7 ZCPLUS

CN Cobalt lithium nickel ruthenium bromide oxide  
(Co0.18Li1.1Ni0.7Ru0.02Br0.101.9) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	1.9	17778-80-2
Br	0.1	10097-32-2
Co	0.18	7440-48-4
Ru	0.02	7440-18-8
Ni	0.7	7440-02-0
Li	1.1	7439-93-2

RN 443893-13-8 ZCPLUS

CN Cobalt lithium nickel tin bromide oxide  
(Co0.18Li1.1Ni0.7Sn0.02Br0.101.9) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	1.9	17778-80-2
Br	0.1	10097-32-2
Co	0.18	7440-48-4
Sn	0.02	7440-31-5
Ni	0.7	7440-02-0
Li	1.1	7439-93-2

RN 443893-14-9 ZCPLUS

CN Cobalt lanthanum lithium nickel iodide oxide  
(Co0.18La0.02Li1.1Ni0.7I0.101.9) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	1.9	17778-80-2
I	0.1	14362-44-8
Co	0.18	7440-48-4
Ni	0.7	7440-02-0
Li	1.1	7439-93-2
La	0.02	7439-91-0

RN 443893-15-0 ZCPLUS

CN Cobalt lithium nickel rhenium iodide oxide  
(Co0.18Li1.1Ni0.7Re0.02I0.101.9) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	1.9	17778-80-2
I	0.1	14362-44-8
Co	0.18	7440-48-4
Re	0.02	7440-15-5
Ni	0.7	7440-02-0
Li	1.1	7439-93-2

RN 443893-16-1 ZCPLUS

CN Cobalt lead lithium nickel iodide oxide  
(Co0.18Pb0.02Li1.1Ni0.7I0.101.9) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	1.9	17778-80-2
I	0.1	14362-44-8
Co	0.18	7440-48-4
Ni	0.7	7440-02-0
Li	1.1	7439-93-2
Pb	0.02	7439-92-1

RN 443893-17-2 ZCPLUS

CN Bismuth cobalt lithium nickel iodide oxide  
(Bi0.02Co0.18Li1.1Ni0.7I0.101.9) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	1.9	17778-80-2
I	0.1	14362-44-8

Bi		0.02		7440-69-9
Co		0.18		7440-48-4
Ni		0.7		7440-02-0
Li		1.1		7439-93-2

RN 443893-18-3 ZCPLUS

CN Cobalt lithium nickel titanium fluoride oxide  
(Co0.18Li1.1Ni0.7Ti0.02F0.101.9) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	1.9	17778-80-2
F	0.1	14762-94-8
Co	0.18	7440-48-4
Ti	0.02	7440-32-6
Ni	0.7	7440-02-0
Li	1.1	7439-93-2

RN 443893-19-4 ZCPLUS

CN Cobalt lithium nickel vanadium fluoride oxide  
(Co0.18Li1.1Ni0.7V0.02F0.101.9) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	1.9	17778-80-2
F	0.1	14762-94-8
V	0.02	7440-62-2
Co	0.18	7440-48-4
Ni	0.7	7440-02-0
Li	1.1	7439-93-2

RN 443893-20-7 ZCPLUS

CN Chromium cobalt lithium nickel fluoride oxide  
(Cr0.02Co0.18Li1.1Ni0.7F0.101.9) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	1.9	17778-80-2
F	0.1	14762-94-8
Co	0.18	7440-48-4
Cr	0.02	7440-47-3
Ni	0.7	7440-02-0
Li	1.1	7439-93-2

RN 443893-21-8 ZCPLUS

CN Cobalt lithium nickel zirconium chloride oxide  
 $(Co0.18Li1.1Ni0.7Zr0.02Cl0.101.9)$  (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
Cl	0.1	22537-15-1
O	1.9	17778-80-2
Zr	0.02	7440-67-7
Co	0.18	7440-48-4
Ni	0.7	7440-02-0
Li	1.1	7439-93-2

RN 443893-22-9 ZCPLUS

CN Cobalt lithium nickel niobium chloride oxide  
 $(Co0.18Li1.1Ni0.7Nb0.02Cl0.101.9)$  (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
Cl	0.1	22537-15-1
O	1.9	17778-80-2
Co	0.18	7440-48-4
Nb	0.02	7440-03-1
Ni	0.7	7440-02-0
Li	1.1	7439-93-2

RN 443893-23-0 ZCPLUS

CN Cobalt lithium molybdenum nickel bromide oxide  
 $(Co0.18Li1.1Mo0.02Ni0.7Br0.101.9)$  (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	1.9	17778-80-2
Br	0.1	10097-32-2
Co	0.18	7440-48-4
Ni	0.7	7440-02-0
Mo	0.02	7439-98-7
Li	1.1	7439-93-2

RN 443893-24-1 ZCPLUS

CN Cobalt hafnium lithium nickel bromide oxide  
 $(Co0.18Hf0.02Li1.1Ni0.7Br0.101.9)$  (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number

O		1.9		17778-80-2
Br		0.1		10097-32-2
Hf		0.02		7440-58-6
Co		0.18		7440-48-4
Ni		0.7		7440-02-0
Li		1.1		7439-93-2

RN 443893-25-2 ZCPLUS

CN Cobalt lithium nickel tantalum iodide oxide  
(Co0.18Li1.1Ni0.7Ta0.02I0.101.9) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	1.9	17778-80-2
I	0.1	14362-44-8
Co	0.18	7440-48-4
Ta	0.02	7440-25-7
Ni	0.7	7440-02-0
Li	1.1	7439-93-2

RN 443893-26-3 ZCPLUS

CN Cobalt lithium nickel tungsten iodide oxide  
(Co0.18Li1.1Ni0.7W0.02I0.101.9) (9CI) (CA INDEX NAME)

Component	Ratio	Component Registry Number
O	1.9	17778-80-2
I	0.1	14362-44-8
Co	0.18	7440-48-4
W	0.02	7440-33-7
Ni	0.7	7440-02-0
Li	1.1	7439-93-2

IT **7440-09-7D**, Potassium, compds. **7440-23-5D**, Sodium, compds. **7440-70-2D**, Calcium, compds. **7704-34-9D**, Sulfur, compds. **443892-75-9**, Lithium nickel borate fluoride oxide (Li1.1Ni0.88(BO3)0.02F0.101.84) **443892-76-0**, Lithium magnesium nickel fluoride oxide (Li1.1Mg0.02Ni0.88F0.101.9) **443892-77-1**, Aluminum lithium nickel fluoride oxide (Al0.02Li1.1Ni0.88F0.101.9) **443892-78-2**, Lithium nickel scandium fluoride oxide (Li1.1Ni0.88Sc0.02F0.101.9) **443892-79-3**, Lithium nickel vanadium fluoride oxide (Li1.1Ni0.88V0.02F0.101.9) **443892-80-6**, Chromium lithium nickel fluoride oxide (Cr0.02Li1.1Ni0.88F0.101.9) **443892-81-7**, Lithium manganese nickel fluoride oxide (Li1.1Mn0.02Ni0.88F0.101.9)

**443892-82-8**, Lithium nickel zinc fluoride oxide  
(Li<sub>1.1</sub>Ni<sub>0.88</sub>Zn<sub>0.02</sub>F<sub>0.101.9</sub>) **443892-83-9**, Gallium lithium  
nickel chloride oxide (Ga<sub>0.02</sub>Li<sub>1.1</sub>Ni<sub>0.88</sub>Cl<sub>0.101.9</sub>)  
**443892-84-0**, Lithium nickel vanadium chloride oxide  
(Li<sub>1.1</sub>Ni<sub>0.88</sub>V<sub>0.02</sub>Cl<sub>0.101.9</sub>) **443892-85-1**, Lithium nickel  
zirconium chloride oxide (Li<sub>1.1</sub>Ni<sub>0.88</sub>Zr<sub>0.02</sub>Cl<sub>0.101.9</sub>)  
**443892-86-2**, Lithium molybdenum nickel bromide oxide  
(Li<sub>1.1</sub>Mo<sub>0.02</sub>Ni<sub>0.88</sub>Br<sub>0.101.9</sub>) **443892-87-3**, Lithium nickel  
technetium bromide oxide (Li<sub>1.1</sub>Ni<sub>0.88</sub>Sn<sub>0.02</sub>Br<sub>0.101.9</sub>)  
**443892-88-4**, Lithium nickel ruthenium bromide oxide  
(Li<sub>1.1</sub>Ni<sub>0.88</sub>Ru<sub>0.02</sub>Br<sub>0.101.9</sub>) **443892-89-5**, Lithium nickel  
tin bromide oxide (Li<sub>1.1</sub>Ni<sub>0.88</sub>Sn<sub>0.02</sub>Br<sub>0.101.9</sub>) **443892-90-8**  
, Hafnium lithium nickel iodide oxide (Hf<sub>0.02</sub>Li<sub>1.1</sub>Ni<sub>0.88</sub>I<sub>0.101.9</sub>)  
**443892-91-9**, Lithium nickel tungsten iodide oxide  
(Li<sub>1.1</sub>Ni<sub>0.88</sub>W<sub>0.02</sub>I<sub>0.101.9</sub>) **443892-92-0**, Lithium nickel  
rhenium iodide oxide (Li<sub>1.1</sub>Ni<sub>0.88</sub>Re<sub>0.02</sub>I<sub>0.101.9</sub>) **443892-93-1**  
, Bismuth lithium nickel iodide oxide (Bi<sub>0.02</sub>Li<sub>1.1</sub>Ni<sub>0.88</sub>I<sub>0.101.9</sub>)  
**443892-94-2**, Lithium nickel titanium fluoride oxide  
(Li<sub>1.1</sub>Ni<sub>0.88</sub>Ti<sub>0.02</sub>F<sub>0.101.9</sub>) **443892-95-3**, Lithium nickel  
niobium chloride oxide (Li<sub>1.1</sub>Ni<sub>0.88</sub>Nb<sub>0.02</sub>Cl<sub>0.101.9</sub>)  
**443892-96-4**, Copper lithium nickel chloride oxide  
(Cu<sub>0.02</sub>Li<sub>1.1</sub>Ni<sub>0.88</sub>Cl<sub>0.101.9</sub>) **443892-97-5**, Lithium nickel  
tantalum iodide oxide (Li<sub>1.1</sub>Ni<sub>0.88</sub>Ta<sub>0.02</sub>I<sub>0.101.9</sub>)  
**443893-00-3**, Lanthanum lithium nickel fluoride oxide  
(La<sub>0.02</sub>Li<sub>1.1</sub>Ni<sub>0.88</sub>F<sub>0.101.9</sub>) **443893-01-4**, Cobalt lithium  
nickel fluoride oxide (Co<sub>0.02</sub>Li<sub>1.1</sub>Ni<sub>0.88</sub>F<sub>0.101.9</sub>)  
**443893-02-5** **443893-03-6** **443893-04-7**  
**443893-05-8** **443893-06-9** **443893-07-0**  
**443893-08-1** **443893-09-2** **443893-10-5**  
**443893-11-6** **443893-12-7** **443893-13-8**,  
Cobalt lithium nickel tin bromide oxide  
(Co<sub>0.18</sub>Li<sub>1.1</sub>Ni<sub>0.7</sub>Sn<sub>0.02</sub>Br<sub>0.101.9</sub>) **443893-14-9**  
**443893-15-0** **443893-16-1**, Cobalt lead lithium  
nickel iodide oxide (Co<sub>0.18</sub>Pb<sub>0.02</sub>Li<sub>1.1</sub>Ni<sub>0.7</sub>I<sub>0.101.9</sub>)  
**443893-17-2** **443893-18-3** **443893-19-4**  
**443893-20-7** **443893-21-8** **443893-22-9**  
**443893-23-0** **443893-24-1** **443893-25-2**  
**443893-26-3**  
(cathode material; nickel-based and nickel-cobalt-based mixed  
oxide-halides as cathode-active materials for lithium-ion  
secondary batteries)